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OF THE MADRAS PRESIDENCY,
BY
MR. EDWIN HOLDER.

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RAM SINGH DEL. MAYO SCHOOL OF ART LAHORE

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The Journal of Indian Art and Industry.

BRASS AND COPPER WARE OF THE MADRAS PRESIDENCY.

By EDWIN HOLDER, Ag: Superintendent Madras School of Arts.

I had hoped to make a tour through the several districts of this Presidency, where brass and copper ware is manufactured, chiefly with the intention of ascertaining the difference (if any) in the modes of work, and in the class of work turned out in different places; but this project was found impracticable. Owing also to a misunderstanding on my part, the preparation of this monograph was considerably delayed, and to make up for the loss of time, I have been obliged to do what I could, together with my usual work, within the short period of one month. It will therefore, I hope, be easily understood that the illustrations herewith submitted do not by any means represent the best specimens of Madras work. For the first part of the report, viz., "A brief account of the artisan class in South India," I am entirely indebted to Dr. Pulney-Andy, who, I think, deserves special thanks for his very interesting contribution; and to the Collectors of the several districts I am indebted for the information which they kindly sent me regarding the principal places of manufacture. The drawings of the various utensils, and photographs of men at work, &c., were executed under my supervision by students of the Madras School of Arts. Plate 48 (illustration of a brass and copper ware stall) is taken from a photograph by Messrs. Wiele and Klein, of Madras.

School of Arts, Madras. EDWIN HOLDER, Ag: Superintendent.

Part I. A Brief Account of the Artisan Class in South India.

The class of artisans known in the Tamil language as *Kammalars*, in the Telugu as *Kamsalas*, an Sanskrit as *Panchalas*, are the descendants of a race of Aryans who entered India by crossing the Panjab before Vyasa began the collection and arrangement of the Vedas, which period has been fixed by Europea oriental scholars as about fifteen centuries B.C. This tribe of Aryans was known in early times under the designations *Visva Brahmins*, *Deva Brahmins*, and *Deva Kammalars*, in contradistinction to the modern Brahmins, who are the descendants of Vasishta, and who were known as *Go-Brahmins*, on account of their custom of receiving cows as gifts. After entering India, this tribe of Deva Kammalars travelled gradually downwards to the south of India, from whence many families are said to have emigrated to other parts of the world. During this period they built many of the famous temples which are still in existence in India; they are also supposed at that time to have occupied the position of spiritual guides and preceptors to the people, as may be understood from the common parlance current in South India that "*Kammala is Jagat Guru.*"

The present families of Kammalars, or artisans, are, as I have said, descendants of this ancient tribe of Deva Kammalars, and following the example of the modern Brahmins, they also ascribe to their forefathers a mythic origin from the face of Visva Karma, who is considered by Hindus as the great Architect of the universe. But the most rational conclusion that one can arrive at from various sayings current amongst these people is that the progenitor of their tribe had five sons. The first-born, named *Manu*, was taught to work in iron; the second, named *Maya*, to work in wood; the third, *Twastra*, in brass, copper, and other alloys; the fourth, *Silpi*, to work in stone; and the fifth and last, named *Visvajna*, in gold and silver, and to set precious stones in jewels. From this, and from the fact that amongst the Kammalars of the present day the hereditary follower of the blacksmith's trade is socially allowed to take the precedence amongst the artisan class, it may be inferred that the ancient Hindus attached more importance to iron, as a useful metal, than to gold and silver, which they considered as merely ornamental.

Though these five orders of hereditary artisans form the chief portion of the mass employed in the various handicrafts, viz., blacksmiths' work, carpentry, metal work, stone work, and jewellery, there are also men of other castes who, having been in the service of Kammalars, have learned their trade, and have set up business on their own account. These in some places have been wrongly included amongst the purely Kammalar class, and thus the social status of the original artisan has to a certain extent been lowered. However, in vindication of their right to higher social position the "Kammalars have always maintained an animated fight for precedence in Hindu society." (*Vide* Manual of the Administration of the Madras Presidency, vol. I, chap. i, page 67).

As regards religion, the majority of the artisans are Sivites, or worshippers of Siva; the others are either Lingyets or Vishnuvites. They go through the ceremony of *upanayanam* for the investiture of the **Sacred thread*. Their marriage ceremony is performed as amongst the Brahmins. Their dead are buried in an erect posture, cremation being resorted to by a very small portion of the community. No instance of the re-marriage of a widow has yet taken place, and in this respect the Kammalars seem to be more strict than Brahmins, amongst whom of recent years there have been instances of widow marriages. The Kammalars do not recognise the modern Brahmins as their priests; those they have are of their own class.

In former times the artisans had their own guilds, which protected the interests of their own trades, and endeavoured to maintain them in a prosperous condition; but as these institutions gradually declined, the Kammalars were obliged to seek the aid of capitalists of other castes, and now they are, in the majority of instances, reduced to mere paid workmen, earning daily wages at the following rates:—

Blacksmiths	... from 8 as. to Re. 1 per day.	Stone masons or Sculptors	... from 12 as. to Rs 1½ per day.
Carpenters	... „ 6 „ to „ 1 „	Goldsmiths	... „ Re. 1 to Rs 3 „
Braziers	... „ 12 „ to „ 1½ „		

The five different occupations, though followed amongst many families as a hereditary calling, are not in any case compulsory; for example, the son of a blacksmith may, if he likes, become a goldsmith, carpenter, or mason, or *vice versa*. The five sects form one compact community. They associate and also intermarry, except in cases where there is a difference of language; for example, Telugu and Tamil-speaking families do not intermarry with each other. They are by their religious doctrines forbidden to have food with men of other castes, and even to partake of food which has been prepared by the Brahmins of the present day.

Madras: 29 May, 1894. (*Signed*) S. PULNEY-ANDY, M.D., F.L.S.

PART II. LOCALITY.

Brass and copper articles, chiefly domestic and sacred, are manufactured in more than 200 towns and villages …e Madras Presidency. Chief amongst these are Kumbakonam, renowned for its beaten brass and copper …sils; Tanjore, for chased ornamental work; and Madura, for cast brass and bell metal ware. The town of …adras itself, where the latest European improvements have been introduced, and where almost every class of metal work is done, from cast iron machinery down to tin pots, is not distinguished for any special class of work.

The following list, which has been drawn up from information given by the Collectors of the several districts, shows approximately the number of towns and villages in each district where copper and brass ware was manufactured during the year 1893:—

1. Godavari district	... 41 towns and villages.	10. Cuddapah district	... 8 towns and villages.
2. Tinnevelly „	... 30 „	11. Chingleput „	... 9 „
3. Trichinopoly „	... 29 „	12. Bellary „	... 2 „
4. Ganjam „	... 28 „	13. Coimbatore „	... 2 „
5. S. Canara „	... 22 „	14. Malabar „	... 2 „
6. Vizagapatam „	... 17 „	15. Madura „	... 5 „
7. S. Arcot „	... 16 „	16. Nellore „	... 7 „
8. N. Arcot „	.. 4 „	17. Madras „	... 4 „
9. Salem „	... 13 „		

N.B. Brass and copper work does not seem to be done in any of the other five districts.

PART III. TOOLS AND METHOD OF WORK.

In Plate 54 are illustrated some of the principal tools necessary for forming an ordinary-sized vessel out of sheet copper or brass, the first stage in the manufacture of which is to cut the sheet metal in a circular form with the scissors (fig. 4), and then to form it into a rough bowl by placing it on one of the hollows in the stone die or mould (fig. 11) and beating it into the hollow with the large hammer (fig. 8). If the vessel is to be simple in form (like figs. 3, 8, and 11, Plate 43), this bowl is placed successively on the broad ends or heads of the irons (figs. 1, 2, and 3, Plate 54), and is beaten or tapped into shape with hammers of different sizes, which vary chiefly as regards the form of the lower or striking ends. Large vessels with narrow necks and bases are generally made in three parts, viz., neck, body, and base, which are afterwards soldered together (see Plates 56 and 57, "Madras

* The Sacred thread is a thin cord tied loosely across the body over the left shoulder, next to the skin. It is never removed. See Plates 41, 56, and 57.

Copper-smiths at work.") Some experts, to show their skill, often make vessels of almost any intricate shape, provided the base be flat, out of a single piece of sheet metal. To watch the smith gradually closing in the upper part of the bowl or half-formed vessel, and then expanding it again to form the neck and mouth, all by mere tapping, is highly interesting.

The process of casting in brass or bell metal, as done in Madras, is very simple. To cast a vessel like the one shown in Plate 43, fig. 10, a solid model of infusible clay is made to correspond with the inside of the vessel; when dry, this is covered over with a layer of prepared wax and is turned on a lathe, a metal rod having been previously driven through the centre of the mass. The whole is then covered over pretty thickly with the infusible clay, and when dry a hole is bored in this outer layer of clay, through which the wax is expelled by heating, and into which the liquid metal is poured. The rod previously inserted keeps the inner and outer masses of clay in position, and thus allows the liquid metal to run freely into the space between them; the clay is then removed, and the vessel finished on a lathe. Fig. 1, Plate 55, is an illustration of the common lathe used by Madras workmen, and fig. 2 is an illustration of the ordinary furnace for melting brass and copper. Bells, images, lamps, ornaments, and a large number of vessels, especially those with spouts, are cast in brass or bell metal. Some articles are said to be cast in pure copper, but this is not true; native workmen have assured me that it is impossible to use the copper quite pure, as the metal has the defect of cooling too rapidly to allow of its running freely into every part of the mould; but a very slight admixture of zinc or lead seems to counteract this defect, while it does not much affect the colour of the copper.

Owing to its costliness, high-class repoussé or chased ornamental work has never been done to any great extent on articles of brass or copper; it has been chiefly confined to silver ware, which is preferred by the rich. In Tanjore, brass and copper utensils are largely ornamented with patterns in pretty high relief, but the work is done chiefly by means of dies; the designs are, in consequence, wanting in vigour and originality when compared with the old repoussé work on copper door-panels, sword-sheaths, &c., or even with the present ornamental silver work. The process of executing this repoussé work is as follows:—The article to be decorated is made of sheet metal of the softest quality; it is filled up with a composition of sandarach, brick dust and oil mixed together, heated, and poured into it while hot; when cold this composition becomes as hard as ordinary sealing wax. The surface to be ornamented is then smeared over with chalk or any other pigment mixed with water, and the pattern is carefully drawn on it with a sharp tool. To raise the ornament, the ground or space round the figures is tapped or beaten in with a hammer and a set of small chisel-shaped tools made either of steel or bell metal. When the ornament is thus roughly embossed, the wax is heated and poured off, all irregularities in the shape of the vessel that may have resulted during the course of the work are set right, the wax is again poured in, and the details in the ornament are carefully worked up in the same manner by tapping with a finer set of tools. On trays, panels, or other flat articles the ornament can be brought out in greater relief than on round vessels, by reversing the article and beating the ornament out at the back. In any case, the composition of wax must be placed on the opposite side to serve as a support during the course of work.

Sheet brass and copper have been imported into India for many years past; the workmen of the present day have no recollection of having used anything else for the manufacture of their wares. Some of the older m[illegible]n say that during the time when imported sheet metal was scarce, Nagapatam copper coins were melted and beaten out into sheets; but as trade improved, the necessity for this gradually ceased. For casting work, cuttings and filings from the sheet, and all old and useless brass and copper articles are utilised.

PART IV. DESCRIPTION OF THE IMPORTANT ARTICLES ILLUSTRATED.

The articles illustrated here are chiefly those used by the natives of Madras. They were all made in the Madras Presidency, and are purely South Indian in style. A few were taken from the collection at the Madras School of Arts; the rest were borrowed for the occasion.

Plate 42 represents a group of the principal vessels in use in an ordinary Hindu family for cooking and serving up food. The most important of these is the *degcha*, or rice boiler (fig. 10); it is always made of copper, and is tinned inside; the other vessels are made either of brass or copper. Fig. 3, a perforated plate, is used for draining off the water from the boiler after the rice is cooked; figs. 9 and 16 are rice coolers; figs. 7, 11, 12 and 18 are vessels for cooking; figs. 15 and 17, for serving freshly prepared sauce; fig. 4 is a betel tray; fig. 8, a tray for confectionery and fruit; fig. 6, a sieve for cleaning raw rice; and fig. 14, a bowl which serves the purpose of a plate for eating out of; this latter is not very common, as leaves are generally used by all Hindus as plates, food being placed in them with the spoons (figs. 1, 2 and 5).

Plate 43 is an illustration of various kinds of water vessels, some of which are used for placing water or milk in, and some for drinking out of. Fig. 2, a vessel with spout, is used in temples for sacred purposes only, when water has to be poured on the offerings. This and figs. 7, 9 and 10 are of cast brass or bell metal; the others are all of beaten work.

Fig. 1, Plate 45, is the ordinary lamp used in Hindu houses; it is called *kudavillaku*, meaning "pot lamp." The pot or reservoir in the centre contains the oil; the cap with a funnel-shaped head, into which the wick is passed, is removable; the lamp rests on a three-legged stand, and is of beaten brass work. Fig. 2, a camphor burner, and fig. 3, a lamp with many wicks, are used in temples and on special occasions, such as marriage ceremonies. Fig. 4 is called a *shadagopam*; it is placed on the heads of those who come to the priest for a blessing, and is only used in Vishnu temples.

Fig. 1, Plate 46, is the ordinary lamp used in Travancore. It is of cast brass or bell metal; the wick is placed at one end, and in the centre is the oil reservoir, with a spoon for taking out the oil when required; it is far more elegant and substantial than any of the Madras lamps. Fig. 2 is an ornament of cast brass usually attached to the end of the yoke in a chariot or car drawn by bulls.

Plates 47 and 48 represent various kinds of cast brass lamps used at marriage ceremonies and other grand occasions; each burner is made to hold five wicks. The figures of birds and other animals have no particular signification; they are merely ornamental.

Plate 49. A bronze image of Siva, the third in order of the Hindu triad, in the character of destroyer or reducer of things to their primitive atoms. He is here shown as dwelling in light, the flame-like pieces representing the rays; his foot is placed on one of the *Ganthiruvars* (a class of celestials inhabiting Swerga or Indra's heaven), whom he has conquered. The images in Plate 50 are of cast copper, not pure copper, but as I have mentioned in Part III, with a slight admixture of zinc or lead.

Plate 51 is from a plaster cast of a copper repoussé panel which was executed in the Madras School of Arts during the time of Mr. E. B. Havell, late Superintendent of the institution, who made a great effort to revive this bold style of ancient repoussé work on copper. At first sight the Madras work might appear grotesque, and perhaps somewhat stiff in the arrangement of lines; but when compared with the repoussé work done in other parts of India, its superiority as regards composition, bold relief, and modelling of details will become apparent. The same may be said of the South Indian wood carving, which could well be compared with the best Italian work, were it not for the excessive amount of conventionality in the treatment of details, especially as regards animals and human figures; the latter are represented in the most grotesque and unnatural forms; and for this reason the modern Tanjore ware, which is full of hideous Swamy figures, is so repulsive to the eye of a true artist. But in all ornamental work in relief, whether on wood, stone, or metal, there is always a considerable degree of understanding and appreciation of form shown, which is wanting in North Indian work, especially of the Muhammadan style. By form I do not mean outline form, but modelling.

Fig. 1, Plate 52, represents an ancient sword-sheath and shield purchased by Mr. E. B. Havell, to whom I have had no time to refer for details. I cannot, therefore, vouch for the articles being of Madras manufacture. The shield is of leather with iron fittings; I have introduced it here merely to correspond with the sword-sheath, which is of copper. The ornamentation on this, in repoussé, is more like the Mysore and Hyderabad ware than like the Madras work. The next illustration on the same page shows a group of Tanjore copper ware embossed and inlaid with silver and brass.

Plate 53 is from a photograph of a screen with copper repoussé panels, executed at the Madras School of Arts for Messrs. Dymes & Co. of Madras, who exhibited it at Glasgow in 1888. Plate 53*a* is an illustration of a group of copper repoussé jars and a panel, also executed at the Madras School of Arts; some trays from Mysore and Tanjore, and a brass flower vase from Travancore.

EDWIN HOLDER,
Ag: Superintendent.

School of Arts, Madras.
16th June, 1894.

ERRATA.—Page 81, line 12, for Plate 48 read Plate 58.

ANALYSIS OF SPECIMENS OF ORIENTAL METAL-WORK.

The following extract is from a Report on the analysis of various examples of Oriental metal-work in the South Kensington Museum and other collections, made under the direction of Professor W. C. Roberts-Austen, C.B., F.R.S., by Arthur Wingham, F.I.C.

This report is the result of an investigation undertaken at the suggestion of Prof. Valentine Ball, C.B., F.R.S., with the view to ascertain whether any marked characteristic existed in the composition of Oriental brass from different localities, or from the same locality but of different ages, and it was hoped that it would be possible by the aid of an analysis to name the locality or to assign the time of production to a brass of uncertain origin, or at least to support any existing idea as to the date of a doubtful specimen.

It was necessary that the analyses should be as complete as possible, as a comparatively rough estimation of the principal metals only would be of little or no use. It was considered that a few exhaustive analyses would be more likely to yield definite results than a larger number of incomplete ones. Every specimen was therefore subjected to a rigid examination, and the greatest care was bestowed, at times under considerable disadvantages, on each analysis, so that every particle of metal could be accounted for and the quantity determined wherever there was sufficient present to admit of this being effected. The chief of the disadvantages referred to was the small quantity of the material at the analyst's disposal, which rendered the estimation of the metals present in small quantity a task of great difficulty, and one requiring special knowledge and skill.

Unfortunately very few brass or bronze objects in the Indian Section could be found whose authenticity as to date was beyond question, and these were nearly all comparatively speaking modern. A few brass specimens of doubtful age but of known locality were therefore chosen, as well as some objects of individual interest. Better fortune was met with in the Persian Court, where there are many authentic objects of various dates during the last ten centuries. These analyses show that the early Persian brasses and bronzes were indefinite mixtures, that the constituent metals were often impure, and further, that no definite composition was persistently aimed at at any one time, except perhaps in the specimens of the 19th century, which appear to be purer than the older ones, and which were probably worked up from imported English sheet brass. No regularity in composition could be traced. THESE RESULTS LEAD TO THE VIEW THAT IT WOULD BE IMPOSSIBLE TO JUDGE WITH CERTAINTY THE AGE OF AN ALLOY FROM ITS COMPOSITION, WHICH WOULD, HOWEVER, RENDER IT POSSIBLE TO DISTINGUISH BETWEEN ANCIENT AND QUITE MODERN EXAMPLES.

The question as to the possibility of determining the locality of specimens is not entirely disposed of. It would probably be difficult to name the province in which a brass was made, but a complete analysis might often help to decide between one of two districts. This would apply more particularly to the ancient specimens which would probably have been prepared from ores found in the locality, before communication with other countries was as easy as it has been of late years, but a much more extended series of complete analyses, including all traces of metals, would have to be made before definite conclusions could be arrived at.

These analyses do not support the opinion that the Eastern metal-workers prepared and employed exceptionally pure metals.

Analysis of Specimens taken from the Indian Court of the South Kensington Museum.

24. BURMESE GOLD. Taken from various objects in the Royal Treasure from Mandalay, now in the India Museum.

ANALYSIS.

Gold	90·70
Silver	6·92
Copper	·92
Iron	·33
Platinum and other rare metals	1·12
	99·99

25. THRONE, octagonal, on eight feet; gold plates chased and repoussé with bold floral and foliated ornament, mounted on wood; with three red and yellow velvet cushions. Made for Runjeet Singh after his accession to Lahore in 1799 A.D. Height 3 ft. 1¼ in., diam. 2 ft. 5 in.

ANALYSIS.

Gold	97·75
Silver	1·11
Copper	1·01
Iron	Nil.
	99·87

26. GOLD COIN. Moghul. 16th century.

Analysis showed that it is of pure gold, as not a trace of any other metal could be detected.

Specially tested for silver, platinum, copper, iron, and lead.

Specific gravity of coin ... 19·265

27. GOLD COIN (Indo-Scythian).

Specific gravity ... ... 18·698

ANALYSIS.

Gold	96·96
Silver	2·41
Copper	·64
	100·01

28. RELIC SHRINE. "Stupa," in four parts (incomplete). Gold repoussé and chased with conventional ornament in bands. Burmese. Discovered in levelling a Buddhist Temple at Rangoon in April, 1855.

ANALYSIS.

Gold	72·02
Silver	22·96
Copper	5·24
	100·22

29. RELIC CASKET, cylindrical; gold, repoussé, set with two rows of rubies, and surrounded by an arcade containing figures of saints, the spandrils filled by birds with out-stretched wings; on the base a conventional lotus. Found in Afghanistan. Buddhist. 1st century B.C.

ANALYSIS.

Gold	90·85
Silver	5·63
Copper	3·65
	100·13

30. RELIC SHRINE. "Stupa." Gold repoussé and chased with conventional ornament in bands, surmounted by a finial terminating in a bud; set with 38 rubies and one emerald. Burmese. Discovered in levelling a Buddhist Temple at Rangoon in April, 1855.

ANALYSIS.

Gold	94·72
Silver	2·72
Copper	2·75
	100·19

31. TASSEL. 16 stems, gold plates held by spirals of gold wire. Burmese. Discovered in levelling a Buddhist Temple at Rangoon in April 1855.

ANALYSIS.

Gold	87·42
Silver	8·44
Copper	3·97
	99·83

32. RELIC SHRINE. "Stupa," in three parts (incomplete). Gold repoussé and chased with conventional ornament in bands. Burmese. Discovered in levelling a Buddhist Temple at Rangoon in April 1855.

ANALYSIS.

Gold	98·01
Silver	1·57
Copper	·38
	99·96

33. BOWL. Gold, unornamented, containing calcined bones and ashes. Burmese. Discovered in levelling a Buddhist Temple at Rangoon in April 1855.

ANALYSIS.

Gold	83·07
Silver	10·36
Copper	6·43
	99·86

34. HELMET, MODEL OF; probably a votive offering. Gold, with a double pin, and 62 jewels set in a border of repoussé ornament. Discovered in levelling a Buddhist Temple at Rangoon in April 1855.

ANALYSIS.

Gold	83·75
Silver	12·22
Copper	4·24
	100·21

35. ANCIENT GREEK SILVER PATERA. Found by Dr. Lord in Badakshan. 4th century, A.D.

ANALYSIS.

Silver	93·63
Gold	1·04
Copper	4·94
Iron	·27
	99·88

36. EWER with COVER. Oxidised metal, damascened with silver. Indian, modern.

ANALYSIS.

Lead	1·298
Copper	3·510
Iron	·049
Silver	Nil.
Zinc, by diff.	95·143
	100·000

37. BUDDHA, seated, praying; zinc.

ANALYSIS.

Copper	2·890	
Tin	·267	
Lead	·172	
Iron	·429	
Nickel	Nil.	
Silver	Nil.	
	3·758	Impurity
Zinc, by diff.	96·242	
	100·000	

38. BOTTLE with COVER. Metal, with raised chasing of flower and leaf pattern, covered with gold and silver foil. Hungarian or Indian. Latter half of 17th century.

ANALYSIS.

Lead	·956
Tin	·346
Iron	·084
Copper	Nil.
	1·386
Zinc, by diff.	98·614

38A. VASE. Oxidised metal, damascened with silver. Indian, modern.

ANALYSIS.

Lead	1·437
Tin	Trace.
Iron	·039
Copper	6·905
	8·381
Zinc, by diff.	91·619

39. WATER BOTTLE. Zinc, or a composite metal resembling it, of elongated form, with flowers and animals in silver inlay, and a foot and two bands of chased silver originally filled in with cloisonné enamel. Resembling the Bidri work of India. Persian? 17th or 18th century.

ANALYSIS.

Lead	·901
Tin	3·587
Iron	·476
Copper	·830
	5·794
Zinc, by diff.	94·206

40. VASE with Handle and Cover, "Phuldan." Perforated brass; the cover surmounted by a knob; the handle formed by two dragons. Nepal.

ANALYSIS.

Copper	78·580
Arsenic	Trace.
Antimony	2·037
Tin	·236
Lead	2·721
Bismuth	·070
Iron	·140
Nickel and Cobalt ...	·068
Zinc	15·849
	99·701

42. PARESNATH, the twenty-third *Tirthankar*, or Saint of the Jains; impure brass. The figure has conventional features and hair, is nude except a girdle, and seated cross-legged on a triangular base, the front of which has conventional ornament in compartments, and is faced with copper and inlaid with silver. Madras.

ANALYSIS.

Copper	69·960
Tin	Nil.
Lead	3·415
Bismuth	Trace.
Iron	·504
Nickel	Trace.
Zinc, by diff.	26·121
Silver	Trace.
	100·000

43. SHRINE FOR A JAIN SAINT, in three portions; brass with bronzed surface. A semi-circular arch supported by two subordinate ornamental shrines, each with a figure of an attendant bearing a chowrie. The bases and crown of the arch have each a small Jain temple enclosing the representation of a Saint. The arch bears a row of seated musicians, and within it is a star-shaped halo, and two elephants bearing musicians and worshippers. Madras.

ANALYSIS.

Copper	75·830
Tin	Trace.
Lead	3·169
Bismuth	Trace.
Iron	·196
Nickel	Trace.
Zinc, by diff.	20·805
Silver ...	Cons. trace.
	100·000

No. 42 was considered to be copper or bronze, but on scraping was found to be brass. In scraping, a fine red dust came off which consisted largely of copper oxide, then the surface became more metallic with copper, on the removal of which the brass was exposed. The brass contained veins and blotches, apparently of copper.

No. 43. Brass, with bronzed surface, somewhat similar to above, but the metal was cleaner, softer, and better made.

These figures appear to have been originally all brass, from the surface of which the zinc has by some means been removed (by burning or by acid), and during which process the copper has become partly oxidised.

44. LOTAH, with Ribbed Bowl. Brass. Calcutta.

ANALYSIS.

Copper	53·260
Arsenic	·205
Antimony	·126
Tin	2·312
Lead	3·983
Bismuth	Trace.
Iron	1·482
Nickel and Cobalt ...	·212
Zinc, by diff.	38·420
	100·000

45. GOGLET. Brass. Travancore.

ANALYSIS.

Copper	76·700
Arsenic	·063
Antimony	Nil.
Tin	22·020
Lead	·839
Bismuth	Trace.
Iron	·196
Nickel and Cobalt ...	Nil.
Zinc	Nil.
	99·818

46. TANJORE BRASS STAND for offering betel in temples.

ANALYSIS.

Copper	71·390
Arsenic	·078
Antimony	Trace.
Tin	9·565
Lead	7·186
Bismuth	Trace.
Iron	·952
Nickel and Cobalt ...	·091
Zinc	10·459
	99·721

47. BULL, brass, on a base with incised ornament; a representation of the Nandi, the sacred bull of Shiva. Benares. 18th century.

ANALYSIS.

Copper	66·090
Arsenic	Trace.
Antimony	Trace.
Tin	5·789
Lead	5·082
Bismuth	Trace.
Iron	·476
Nickel and Cobalt ...	·197
Zinc, by diff.	22·366
	100·000

48. BELL, brass, handle surmounted by a group of figures. Tanjore, Madras.

ANALYSIS.

Copper	77·140
Arsenic	·136
Antimony	Trace.
Tin	20·830
Lead	·410
Bismuth	·048
Iron	·093
Nickel	Trace.
Zinc	·398
Gold and Silver	Nil.
	99·055

50. BELL, without clapper. Burmah.

ANALYSIS.

Copper	69·550
Arsenic	Trace.
Antimony	Trace.
Tin	16·090
Lead	12·610
Bismuth	·054
Iron	·098
Nickel	·083
Zinc	1·556
Gold	Nil.
Silver	Trace.
	100·041

INSCRIPTION (translation).

"In the month of Tabohdwe (February) on the fifth of the waning moon, in the year 1204 (1842 A.D.) on a Sunday at about 4 p.m. this bell was cast and moulded of pure copper. Its weight is 594,049 kyats (an obvious mistake). There are four lions on the hanging apparatus. Its height is nine fingers' breadths, the diameter five inches, the circumference fifteen, the thickness twenty-four. It is called the "Mahahtee Thadda Ganda" (the great sweet sound).

"The man who had this royal bell moulded was the Burman King, Tharrawahdy, Kohn Boung Min."

51. BELL; dragons in relief and incised inscription. Burmah.

ANALYSIS.

Copper	78·120
Arsenic	·221
Antimony	Nil.
Tin	19·180
Lead	1·913
Bismuth	·097
Iron	·105
Nickel	·114
Zinc	Nil.
Silver	·090
Gold	Nil.
	99·840

52. Bell, bronze. Swinging shackle ornamented with two grotesque lions. With inscription, dated 1828 A.D. Burmese.

ANALYSES of TWO SAMPLES, the first taken from the lip, the other from the top.

Copper	...	...	78·500
Arsenic	...	...	·205
Antimony	...	...	·198
Tin	...	...	12·730
Lead	...	...	5·520
Bismuth	...	...	·215
Iron	...	...	·322
Nickel }	...	...	Trace.
Zinc }	...	...	1·749
Silver	...	...	·263
Gold	...	...	Nil.
			99·702

Copper	...	...	78·050
Arsenic	...	...	·154
Antimony	...	...	·229
Tin	...	...	12·850
Lead	...	...	6·292
Bismuth	...	...	·251
Iron	...	...	·210
Nickel }	...	...	Trace.
Zinc }	...	...	1·524
Silver	...	...	·218
Gold	...	...	Nil.
			99·778

These two samples of the same object were taken to ascertain whether the metal was the same at one end of such a heavy and large Oriental casting as at the other, this being of especial interest, as the amount of metal in the bell is very much more than could be melted in one pot, such as the Indian metal-workers could obtain. Weight, about 9 or 10 cwts.

It is well known that the Indians, when casting a large object, divide their metal into lots, which are placed and melted in small pots heated by separate fires, situated all round the foundry. When everything is ready each pot is taken out of its fire in turn and its contents poured into the mould. Consequently, a large casting may have a very different composition at its opposite ends, especially if the alloy be a complex one. From the above analyses the metal in this instance appears to be more homogeneous than would have been expected.

A curious point about the analyses also is the tendency shown by the heavier metals (lead, bismuth, antimony, and tin) to predominate in the sample from the top, and *vice versa* in that from the lip, distinctly pointing to separation. This would seem to suggest that the metal was cast in a hot mould and an attempt made to mix the various additions in the mould itself, with the consequent slow cooling, and, as a result, partial separation of the metals.

It would also tend to show that the bell was cast upside down, lip uppermost. This bell contains a most interesting inscription full of pious sentiments.

53. BURMESE GUN, in form of a dragon.

ANALYSES of TWO SAMPLES, the first from the mouth end, the other from the tail or breech end.

Copper	...	...	89·490
Arsenic	...	...	Trace.
Antimony	...	...	Trace.
Tin	...	...	4·893
Lead	...	...	2·118
Bismuth	...	...	Trace.
Iron	...	...	·238
Nickel	...	...	Trace.
Zinc	...	...	3·049
Gold	...	...	Nil.
Silver	...	...	Nil.
			99·788

Copper	...	...	85·930
Arsenic	...	...	Trace.
Antimony	...	...	Trace.
Tin	...	...	7·654
Lead	...	...	4·748
Bismuth	...	...	Trace.
Iron	...	...	·210
Nickel	...	...	Trace.
Zinc	...	...	1·501
Gold	...	...	Nil.
Silver	...	...	Nil.
			100·043

54. HANUMAN, the monkey ally of Rama; copper and brass, cut through to show process of casting. Madras. Modern.

This specimen of art metal work is of peculiar interest, insomuch as it was apparently a compound casting showing on its surface two distinct metals, viz., bronze and brass, very much interspersed. The figure was not of one metal altered in colour in parts by superficial treatment, as inspection showed the colour to be due to the metal itself. Owing to the intermixture of the metals—the way in which they protruded one beyond the other at different points, and the small quantity at parts of one metal over the other, such as the bracelets, armlets for example—it was difficult to understand from outside examination how these figures were made. With the object of solving the question it was considered that some light might be thrown on the subject if the casting were cut in halves from top to bottom. This was done, and immediately the whole process was explained, as it is quite clear that a core of copper was originally cast, of a shape showing due regard to the result desired, and that the brass was cast round the copper.

From what is known in connexion with small Oriental castings, it is probable that the following process has been employed in the production of these double castings. First, a model has been carved in wax, of a shape and size necessary to bring out the copper where that metal is required at the surface, and leaving space where the yellow surface is desired for the future casting of brass. This wax model has then been moulded, the mould heated and the wax melted out, after which the copper has been cast in the mould. Then round this half figure, with its prominent parts, where necessary, more wax has been cast, and carved into the shape of the figure ultimately required. The whole has then been moulded, the wax removed as before, and the brass run into the mould, filling up the spaces existing between it and the copper core in the centre. The double casting has then been removed, the brass filed down, wherever it might accidentally and unnecessarily have covered the copper until the red metal was exposed, the whole being then chased and completed.

This casting is probably about 40 years old, and was made in Madras. The art of double casting, as represented by this figure, is very old (a thousand years or more), and has been practised at, and almost entirely confined to, the east coast of the Madras Presidency.

Mr. Havell, of the Madras School of Arts, who has been engaged on a survey of Art manufactures for the Government, reported in 1887 that these castings were no longer made.

LIST OF ILLUSTRATIONS.

Nineteen full-page Plates [41 to 58] illustrating "BRASS AND COPPER WARE OF THE MADRAS PRESIDENCY."

EMPIRE OF INDIA EXHIBITION, 1895.

LOAN EXHIBITION OF RELICS AND MEMORIALS OF THE LATE HONOURABLE EAST INDIA COMPANY.

From the following letter by Sir George Birdwood, reprinted from *The Times* of the 5th February, it will be seen that it is proposed to make a collection of relics and memorials of the late Honourable East India Company in connection with the Empire of India Exhibition to be held at Earl's Court, Kensington, next May. We welcome the proposal with the utmost cordiality as a sign of the awakening interest, first aroused by Sir George Birdwood's Report on the Old Records of the India Office,* in the history of a great city company which did more than all the other institutions of the country put together to build up the gigantic fabric of the British Empire as it at present exists under the beneficent sway of the Queen-Empress of India. The success of the proposed exhibition is, we feel, assured by Sir George Birdwood's energetic letter, which will stir up enthusiasm in every family throughout the United Kingdom connected with the late Honourable East India Company. Sir George Birdwood's energy at his age is something truly remarkable; and whether it be Primrose Day, Cider, or the glory of the old East India Company, he seems gifted with the power of kindling that sober, abiding enthusia[illegible] which at once leads to a practical result. We would particularly draw attention to paragraph A of his l[illegible], which we hope will find an active co-operative response in tens of thousands of British hearts; probably [illegible], that parenthetic line referring to the submergence of "all the moonlit loveliness and lone melody of Phila[illegible]ill do more for the preservation of that sacred island than all that has yet been written on the subject.

We propose, with the approval of the owners, to illustrate all the more interesting objects that may b[illegible]n-tributed to the Loan Collection in future numbers of the *Journal of Indian Art*, or in the form of a s[illegible]ecial publication.

COPY OF A LETTER FROM

Sir GEORGE BIRDWOOD, K.C.I.E., C.S.I., M.D., LL.D.,

Published in *The Times* of 5th February, 1895.

TO THE EDITOR OF THE TIMES.

Sir,—I would beg your indulgence in allowing me space to appeal through the columns of *The Times* to the public here and in India for contributions to the Loan Exhibition of Relics and Memorials of the late Honourable East India Company, to be opened in May next, in connection with the Empire of India Exhibition at Earl's Court.

The present year marks the completion of the third century since the Dutch, on the advice of Cornelius Houtman, formed their East India Company, and established a factory in Java and commenced furiously driving the Portuguese and Spaniards out of those Eastern seas the opulent trade of which they thus hoped themselves to monopolize.

Their wonderful successes at the very moment when Queen Elizabeth was obliged to recall her forces from France and Holland to defend her own shores against the Spaniards greatly excited the emulation of the now rapidly rising middle classes in England and gave the first practical stimulus to their long premeditated determination to participate in the commercial exploitation of the Indian Ocean, which five years later, namely in 1600, resulted in the charter granted to "The Governor and Company of Merchants of London trading into the East Indies," the earliest of the connected series of English East India companies.

This year is also the three hundredth from the capture, by the combined Austrian and Italian forces, of Gran from the Turks, which, following so soon after their defeat at Lepanto, and their expulsion from Persia, shook the Ottoman power to its basis, and laid Southern Asia bare to the most successful of the European merchant adventurers—who proved to be the English—competing for "the riches of Arabia, and the wealth of Persia and India."

* See Nos. 31, 33, and 34 *Journal of Indian Art*; also *Report on Old Records of the East India Company*, 3rd edition, Allen & Co., 1890; *The First Letter Book of the East India Company*, Quaritch, 1894.

The opening of an Industrial and Commercial and Spectacular Exhibition of the Indian Empire during the ensuing summer seemed to me, therefore, to afford an appropriate opportunity for organizing a temporary loan collection of relics and memorials of the East India Company, which is sure to prove generally interesting and attractive, but which will, in my hope, be chiefly valuable in providing a rehearsal of the literary celebration of the tercentenary of the company's first charter in 1900—the date fixed, as I understand, for the completion of Sir W. Wilson Hunter's projected history (1600–1857) of British India. The directors of the Empire of India Exhibition at once accepted my suggestions on the subject, and have invited a number of specialists to advise them in detail in regard to it; and they have undertaken every reasonable responsibility for the reception, custody, insurance against fire and other injuries, and return, at the close of the exhibition, of the objects lent to it. The honorary committee of advice includes, among others, the names of Mr. F. C. Danvers, Sir Joseph Fayrer, Mr. George Forrest, Sir W. Wilson Hunter, and Mr. Clements R. Markham.

The following are the principal classes of relics and memorials, the loan of which it is most desirable to obtain:—

A.—Portraits, which will chiefly be engravings, of notable members of the company, or of servants of the company and other persons who distinguished themselves in the company's service. Portraits are particularly wanted of William Hedges, William Gyfford, William Fytche, Harry Verelst, and John Cartier, and Warren Hastings; of Sir William Langhorn, Streynsham Master, Elihu Yale, Thomas Pitt, Sir Thomas Rumbold, Lord Harris, Lord Clive, Sir Thomas Munro, and Lord Elphinstone, and of Sir Abraham Shipman, Sir Gervase Lucas, Sir George Oxenden, Gerard Aungier, Sir John Child, Sir Josiah Child, Sir Nicholas Waite, Richard Bourchier, William Hornby, Sir William Meadows, Sir Robert Abercromby, Jonathan Duncan, Evan Nepean, Mountstuart Elphinstone, Sir John Malcolm, Sir Robert Grant, James Farish, Sir William H. Macnaghten, Sir George Arthur, Lestock Robert Reid, Sir George Clerk, and Viscount Falkland; and among the more famous directors of the company, of Sir George Wombwell, Robert Gregory, Sir Henry Fletcher, Sir Stephen Lushington, John Travers, Charles Grant, Sir James Carnac, Sir J. Weir Hogg, William Butterworth Bayley, Sir Richard Jenkins, Colonel Sykes, and Captain Eastwick.

B.—Paintings, drawings, sketches, or engravings of buildings, or scenes, connected with the company's history; or of memorable events, or actions, or episodes, connected with the same; or illustrating life in India under the company's rule, particularly its romantic side. Most welcome would be any sketches or photographs of the early English tombs at Surat, of the m[illegible]ny old English buildings still standing which had their importance in the company's days, such as Bombay Castle, the factory [illegible]ajapur, where Sir John Child spent many years, and which was twice sacked by Sivaji's merry men; and of the old factory s[illegible]f Anjengo and Masulipatam, imperishably associated with the name of Eliza Draper. And, again, photographs or sketches o[illegible]churches and mansions erected by, or the monuments erected to, members and servants of the East India Company in th[illegible]ntry.

[illegible]-Original maps and plans of battles and manuscripts, particularly letters of special interest relating to India, by dis[illegible]ished Anglo-Indians.

[illegible]—Seals, and impressions of seals, when these are distinct, and naval and military flags and colours, and stamps and impr[illegible]ons of the company's "bale-mark."

E.—Medals given by the company, and coins issued by them prior to 1858.

F.—Naval and military uniforms of the company; and arms, particularly those bearing the company's "arms" or their "bale-mark"; the silver badges of their boatmen; and the truncheons of their constables. Of these three last classes of objects an immense number are to be found among the descendants of the subordinate servants of the company, and in the unconsidered holes and corners of old East-end curiosity shops and pawnshops along the Ratcliff-highway.

G.—Swords of honour and presentation plate.

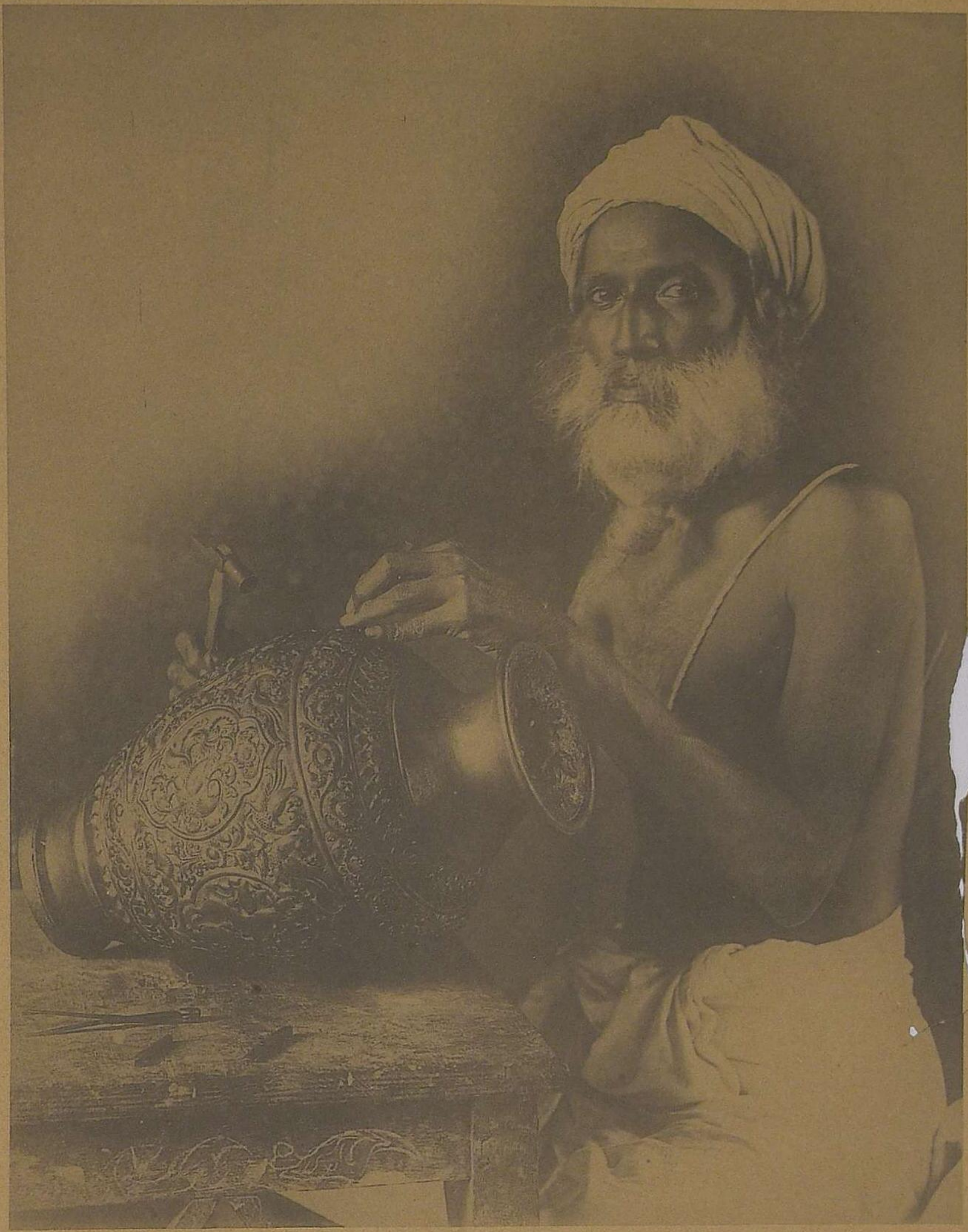
H.—Furniture and marble bas-reliefs and statuary, from the old East India House, removed from it in cartloads to "the four imagined corners of the world" when the company which for 200 years had been the glory of East London, and made its prosperity, was, to the ruin of the "East-end," broken up, and the administration of its sequestrated assets, the Indian Empire, transferred to the "West-end" of London.

The transfer was effected with a brutal disregard of historical susceptibilities of which only Englishmen—who to-day would callously submerge all the moonlit loveliness and lone melody of Philæ—are capable, and which made the gap in the monumental representation of the great East India Company in the city of its rise, culmination, and extinction everyone now deplores, or affects to deplore, and which the proposed exhibition is an attempt to, in some measure, repair.

I will only add that those having any relics or memorials of the late Honourable East India Company, which they would wish to lend to the exhibition, should address themselves to William Foster, Esq., honorary secretary to the H.E.I. Co.'s Loan Collection, Empire of India Exhibition, Earl's Court, S.W.

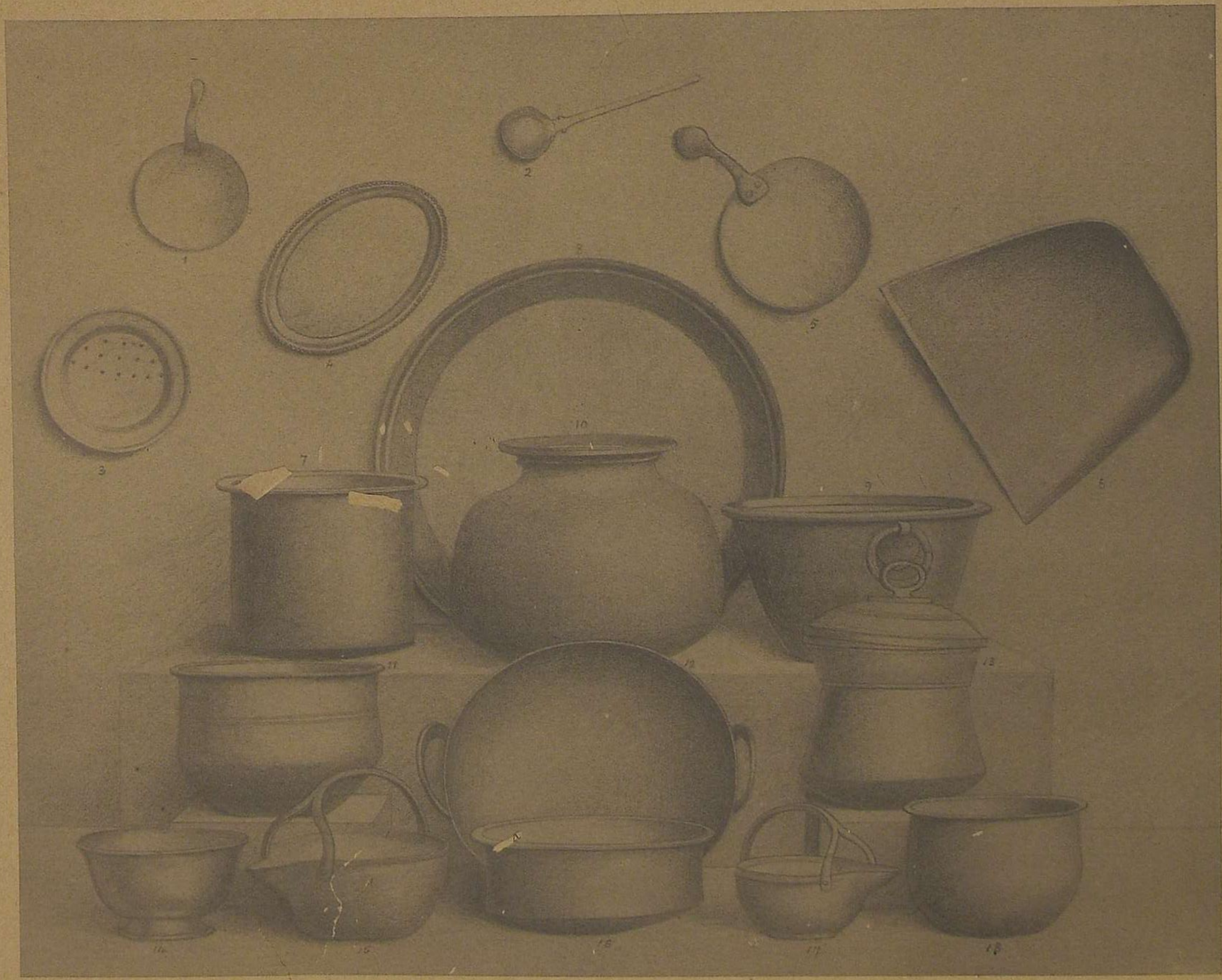
I have the honour to be, Sir, your most obedient, grateful servant,

GEORGE BIRDWOOD.



41.—A SILVERSMITH AND MANUFACTURER OF BRONZE IMAGES. Madras.

Photographed by H. A. Wilkins, Student Madras School of Arts.



42.—Utensils for C[illegible] Serving up Food.

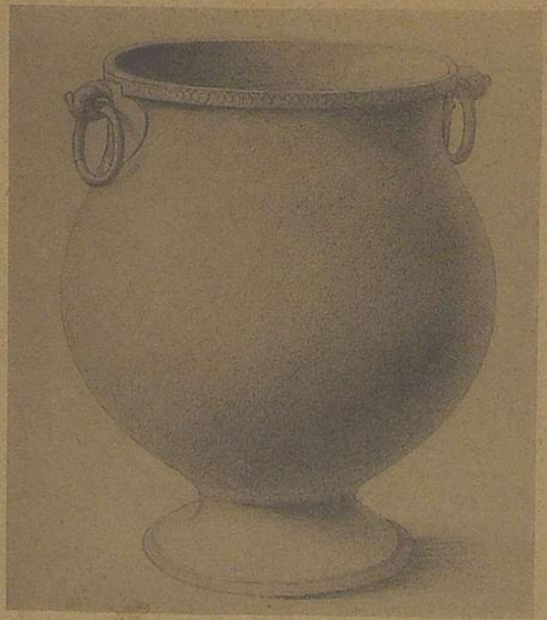
Drawn by C. Gangatharen, [illegible] School of Arts.

SCALE ONE-SIXTH FU[illegible]

12. V[illegible] [illegible]ATER AND MILK.

Drawn by C. Gangat[illegible] [illegible]adras School of Arts.

SCALE ONE-FOU[illegible]



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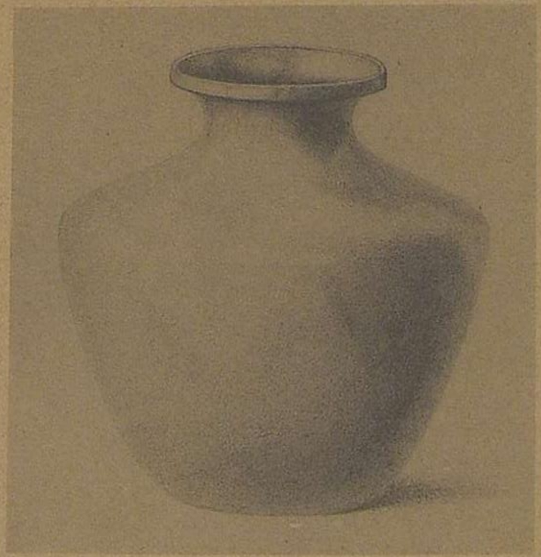

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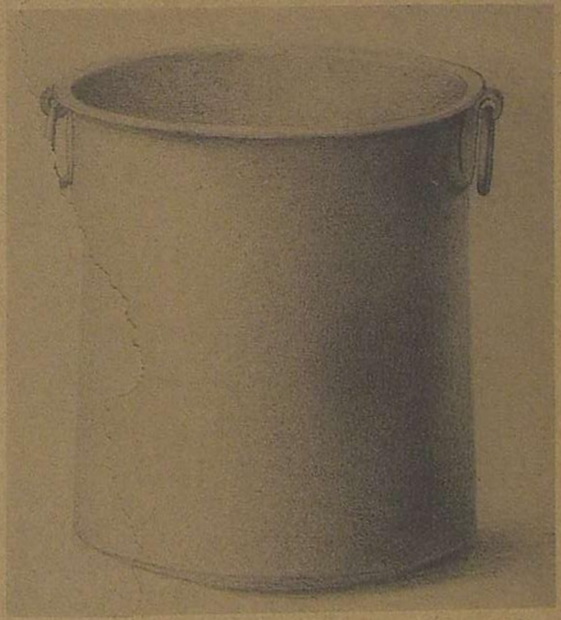

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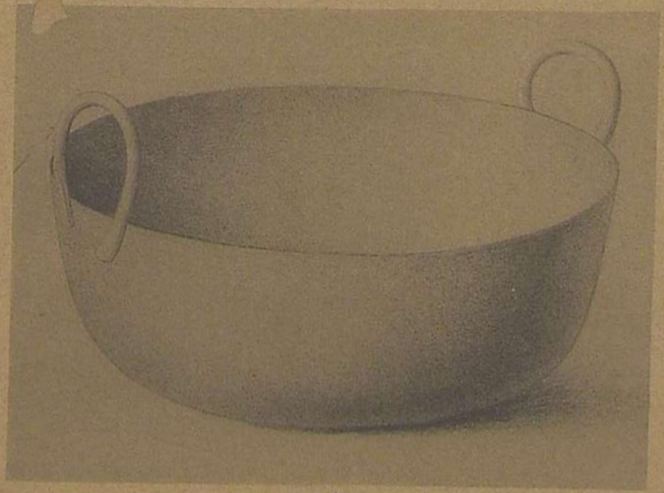

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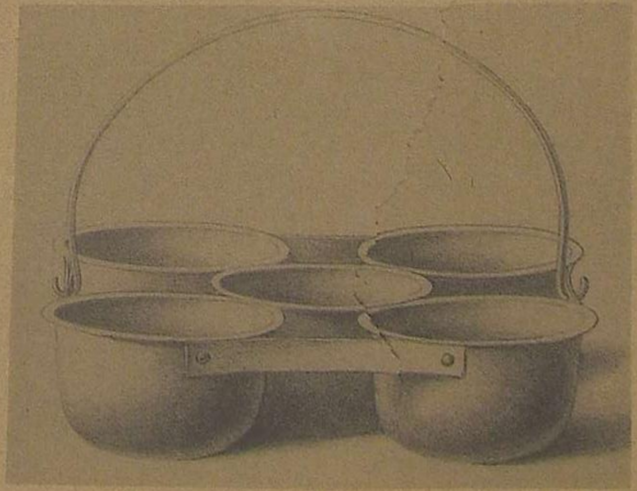


5.

44.—Brass and Copper Vessels.

1. Copper [illegible] 2. Brass vessel for carrying water.

SCALE ONE-FOURTH.

[illegible] 4. Brass vessel for cooking.

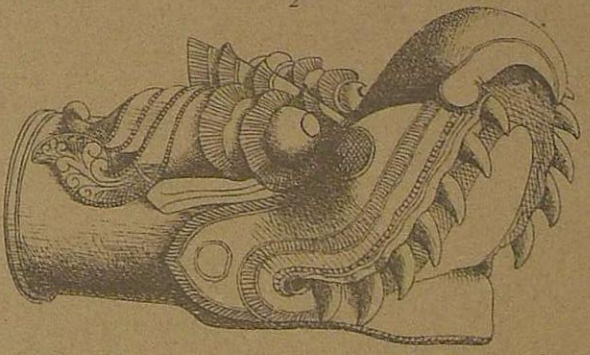
SCALE ONE-FOURTH.

[illegible]ry or pickle.

[illegible] Arts.

1

2



3

4

1. Cast brass lamp from Travancore. 2. Cast … o the end of a yoke.

3. Camphor burner. … rner.

SCALE ONE …

Drawn by …

1.

2.

3.

4.

45.

1. Lamp with single wick on stand. 2. Camphor burner.

SCALE ONE-THIRD.

3. Brass lamp with five movable plates, each containing a number of hollows for wicks.

SCALE ONE-FOURTH.

4. *Shadagopam*, a sort of cap of beaten copper used in Vishnu temples for benediction.

SCALE ONE-THIRD.

Drawn by C. Gangatharen, Student Madras School of Arts.

47. ... LAMPS

Preservation of National Monuments in India.

Privately printed, for Subscribers only.

A selection of 100 plates, 49 of these in colours, prepared in the Office of the late Curator of Ancient Monuments in India, with descriptive text. In preparation by W. GRIGGS, London. 4to Imperial, £3.

TOMB OF AKBAR, SIKANDRA.

1—Border round panel, Vestibule.
2—Dado and panel on right of entrance passage.
3—Dado and panel, Vestibule.
4—Border round dado, Vestibule.
5—Detail, Vestibule.
6—Panel over door of passage, Vestibule.
7—Detail of border in alcove, Vestibule.
8—Cornice below springing of vault, Vestibule.
9—Detail of soffit of arch, Vestibule.
10—Border round spandril of arch, Vestibule.
11—Coffering in ceiling, Vestibule.

TOMB OF ITMAD-UD-DAULAH, AGRA.

12—Spandril over door, south oblong room.
13—Alcove in ceiling, west oblong room.
14—Band above alcove, east oblong room.
15—Ceiling, east oblong room
16—Ornament on alcove in ceiling, east oblong room.
17—Detail of fresco painting.
18—Ceiling in alcove, south oblong room.
19—Detail of fresco painting.
20—Central chamber, ground floor.
21—Centre-piece in dome, ground floor.
22—Detail of ceiling in central chamber.
23—Band beneath alcove
24—Detail in central chamber.
25—Detail in central chamber.
26—Detail in central chamber.
27—Ceiling on north side of central chamber.
28—Painted decoration on ceiling.
29—Painted decoration on ceiling.
30—Painted decoration on ceiling.

GWALIOR.

[illegible]nt in the Lashkar or Camp.

DIWAN-I-AM IN THE FORT, DELHI.

32—Mosaic work at the back of the Marble Throne.

DIWAN-I-KHAS IN THE FORT, DELHI.

33—Details of painted ceiling.

RAJPUTANA.
PALACE AT UDAIPUR IN MEWAR.

34—Jalnavas in the palace.
35—Coloured mosaic.
36—Wooden door, inlaid with ivory, of the Bari Mahal.
37—Wooden door, inlaid with ivory, of the Bari Mahal.
38—Wooden door in the Chandra Mahal.

CHITTOR.

39—Tower of Victory, detail of lower portion.
40—Ahar-ki-Darwaza.

GREAT TOPE, SANCHI, BHOPAL STATE.

41—Filling in of the breach.
42—View from the north.
43—Enlarged view of ditto.
44—View from the south, shewing the Vihara.
45—Southern gateway, front view.
46—Southern gateway, back view.
47—West gateway, back view.
48—Small gateway, back view.

MADURA, MADRAS.
GREAT TEMPLE TO SIVA AND HIS CONSORT.

49—Mutte Goparam, north face.
50—Colonnade in the Mutarli Mandapam.
51—Colonnade in the Via Vasanta Rayar Mandapam.
52—Jewels used in the Temple.'

TRICHINOPOLY.
GREAT TEMPLE TO VISHNU ON THE SRIRANGAM ISLAND.

53—General Plan.
54—Plan and Section of the Thousand-pillar Mandapam.
55—Carved Pillars in the Seshgiri Rao Mandapam.
56—Column B in the Seshgiri Rao Mandapam.
57—Column A in Seshgiri Rao Mandapam.
Column L in the Thousand-pillar Mandapam.
58—Column C in the Ranga Vilasa Mandapam.
Column G on General Plan.
59—Column E in Ranga Vilasa Mandapam.
Column H on General Plan.
60—Mandapam marked D on General Plan.
61—Columns M and K in the Thousand-pillar Mandapam.
62—Column F and Door J on General Plan.

JAMBUISHWAR TEMPLE NEAR TRICHINOPOLY.

63—General Plan.
64—Plan and Section of the Thousand-pillar Mandapam.
65—Columns C and B, and Column G in the Thousand-pillar Mandapam.
66—Columns E and F in the Thousand-pillar Mandapam.
Column A in the Maisur Raja's Mandapam.
67—Column D in Anjal Mandapam, and Door H in gate of 3rd enclosure.

SHAHDARA, NEAR LAHORE.

68—General Plan of the Tomb of Jahangir.
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70—Details of marble and stone on outer face.
71—Ditto ditto and details of door.
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LAHORE FORT.

77—Plan.

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78—General Plan.
79—Gateway E.
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82—Plan and Elevation of the Darshani Darwaza.
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98—Ditto ditto
99—Ditto ditto
100—Ditto ditto

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40.—TOMB OF AKBAR, SIKANDRA. Goffering in ceiling, Vestibule.

Scale 6 inches to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.

39.—Tomb of Akbar, Sikandra. Border round spandril of arch, Vestibule.

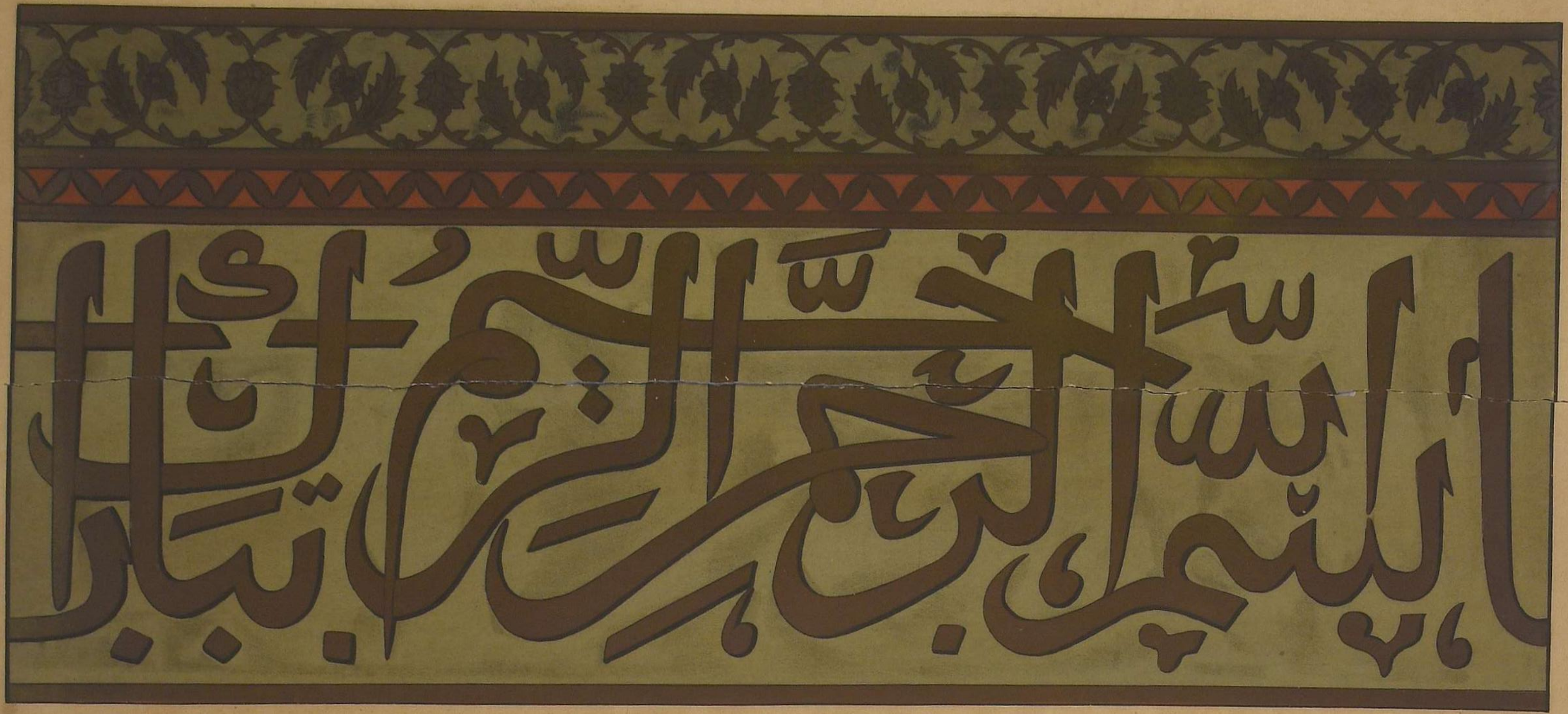
Scale 6 inches to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.

38.—TOMB OF AKBAR, SIKANDRA. Detail of soffit of arch, Vestibule.

Scale 2 inches to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.



37.—Tomb of Akbar, Sikandra. Cornice below springing of vault, Vestibule.

Scale full size.

CHROMO-LITH. BY W. GRIGGS. LONDON.

36.—Tomb of Akbar, Sikandra. Detail of border in alcove, Vestibule.

Scale 3 inches to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.

35.—TOMB OF AKBAR, SIKANDRA. Panel over door of passage, Vestibule.

Scale 2 inches to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.

34.—TOMB OF AKBAR, SIKANDRA. Detail, Vestibule.

Scale full size.

CHROMO-LITH. BY W. GRIGGS, LONDON.

33.—TOMB OF AKBAR, SIKANDRA. Border round dado, Vestibule.

Scale ½ inch to 1 foot.

CHROMO-LITH. BY W. GRIGGS, LONDON.

32.—TOMB OF AKBAR, SIKANDRA.

Dado and panel, Vestibule

Scale 1½ inches to 1 foot.

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